



# The Australian Medical Assessment Collaboration

## From proof of concept to proof of sustainability

Final Report 2014

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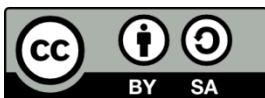
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## List of acronyms used

ACCLaIM	Australian Collaboration for Clinical Assessment in Medicine
ACER	Australian Council for Educational Research
AHELO	Assessment of Higher Education Learning Outcomes
ALTC	Australian Learning and Teaching Council Ltd
AMAC	Australian Medical Assessment Collaboration
AMC	Australian Medical Council
AMSAC	Australian Medical Schools Assessment Collaboration
IDEAL	International Database for Enhanced Assessments and Learning
MDANZ	Medical Deans of Australia and New Zealand
MCQ	Multiple Choice Question
OECD	Organisation for Economic Cooperation and Development
OLT	Office for Learning and Teaching

# Executive summary

This is the final report of a project for the Office for Learning and Teaching (OLT), titled *Australian Medical Assessment Collaboration: from proof of concept to proof of sustainability*, otherwise referred to below as 'AMAC-2'. This project advances previous work funded by the Australian Learning and Teaching Council (ALTC) which involved the initiation of the Australian Medical Assessment Collaboration (AMAC). AMAC-2 takes the proof of concept achieved through the initial AMAC project with the aim of building an ongoing, sustainable and successful collaboration between medical schools in Australia and New Zealand.

This collaboration focuses on shared assessment for the purpose of comparative evaluation and quality improvement. The original project team (those involved in the project proposal) included ten medical schools and a not-for-profit educational research organisation. Following the receipt of the grant by the OLT, a further five Australian medical schools and one New Zealand medical school have become active participants in AMAC.

As a core part of this project, the AMAC team have produced three documents detailing key issues relating to the development, sustainability and effective administration of collaborative assessment projects in higher education:

1. *Determining the quality of assessment items in collaborations; aspects to discuss to reach agreement*
2. *Implementing common assessment: lessons and models from AMAC*
3. *Governance Models for Collaborations involving Assessment*

It is intended that these three documents are used as resources widely across different higher education disciplines, offering some useful ideas to those considering developing collaborative ventures in the future for the purpose of creating common assessment, sharing ideas and expertise and developing comparative data for continuous improvement.

In addition to this, during this project, the AMAC team have developed new items for testing the competencies of medical students in the clinical years, through submission of assessment items from member medical schools, workshops with clinicians in medical schools across Australia and the implementation of assessments with AMAC items in eight medical schools in 2013, involving about 1500 medical students during their clinical years.

The AMAC project has contributed significantly to the development of an ongoing project by the Medical Deans of Australia and New Zealand, which is currently implementing common assessments across all medical schools in Australasia with the aim of developing benchmarks, improving assessment quality and developing a sustainable collaboration.

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# Introduction

This is the final report of a project for the OLT, titled *Australian Medical Assessment Collaboration: from proof of concept to proof of sustainability*, otherwise referred to below as 'AMAC-2'. This project advances previous work funded by the Australian Learning and Teaching Council (ALTC) which involved the initiation of the Australian Medical Assessment Collaboration. AMAC-2 takes the proof of concept achieved through the initial AMAC project with the aim of building an ongoing, sustainable and successful collaboration between medical schools in Australia and New Zealand.

As documented here, AMAC-2 has produced a series of resources that inform the design and establishment of a multi-institutional assessment collaboration. This collaboration focuses on shared assessment for the purpose of comparative evaluation and quality improvement. The original project team (those involved in the project proposal) included ten medical schools and a not-for-profit educational research organisation. Following the receipt of the grant by the OLT, a further five Australian medical schools and one New Zealand medical school have become active participants in AMAC.

Essentially this project has taken the 'proof of concept' and national engagement in learning outcomes assessment established through the initial AMAC project and 'translated' this into a series of resources that can be used to demonstrate the 'proof of sustainability' of an established, functioning and productive collaboration. The general focus of this collaboration is to underpin sustainable development of shared assessments of higher education learning outcomes. The project has also involved the further development of assessment items, testing of items and the development of reporting on common assessments to better inform students and institutions.

Overall, AMAC has adopted a 'structured bottom-up model' to building common assessment items for the evaluation of learning outcomes across universities. The project has established that in order to be able to use the collaborative approach for serious quality improvement there are some requirements that need to be met. There needs to be:

- a value proposition that engages schools and delivers useful outcomes and perspectives not otherwise available;
- a process that guarantees sufficient buy-in from the participating schools, which means that consensus needs to be reached about the quality and credibility of the collaboration and its outcomes;
- a process of internal assessment quality control that is replicable in the participating schools and that can easily be implemented and scaled for others;
- a strong overarching governance structure that co-ordinates the collaborative process, the quality control and the ownership of materials and data collected with the material (including for collaborative research);
- a clear understanding of the executive and financial power of such an overarching body; and
- a plan for development of expertise in assessment material production and ongoing professional development activities.

During this project, the AMAC team have implemented assessments of AMAC items in eight medical schools in 2013, involving about 1500 medical students during their clinical years. In addition, 50 new items have been developed through item revision workshops in three of the participating medical schools.

Finally, the AMAC team have produced three documents detailing key issues relating to the development, sustainability and effective administration of collaborative assessment projects in higher education:

1. *Determining the quality of assessment items in collaborations; aspects to discuss to reach agreement*
2. *Implementing common assessment: lessons and models from AMAC*
3. *Governance Models for Collaborations involving Assessment*

These three documents form the core output of this project and draw on the experiences of those involved in the development of AMAC. It is intended that these three documents are applicable more widely across different higher education disciplines, offering some useful ideas to those considering developing collaborative ventures in the future for the purpose of creating common assessment, sharing ideas and expertise and developing comparative data for continuous improvement.

This report begins by providing some background to this project. It then explores the project approach and outlines the project's outcomes and achievements.



## Background and context

The initial AMAC project was instigated in order to improve the quality of medical education in Australia through the recognition of the need for quality comparison, sharing of expertise and acknowledgement of the need for high quality assessment in Australian medical schools. This is seen by the project team as one of the important foundations in the development of high quality and highly skilled future doctors.

AMAC evolved at the beginning of a new era of accountability for Australian higher education, signalled by the establishment of the national Tertiary Education Quality and Standards Agency (TEQSA), the development of mission-based compacts for universities and work towards establishing a regulatory and quality framework (Australian Government, 2009), and in medicine, with the establishment of the Australian Health Professions Regulatory Agency (AHPRA) (Edwards, Wilkinson, Canny, Pearce, & Coates, 2014). AMAC was conceived as a way of working towards the overarching goals of government, but premised on the idea that a key means of achieving this is through *collaboration* by schools in the development of high quality instruments for assessing and monitoring quality.

As such, the focus of AMAC has been on enabling ongoing *self-regulation* of the profession through the evaluation of learning outcomes. Key to this role is that the evidence medical schools can use through AMAC is developed, discussed and disseminated by the schools themselves, rather than being imposed on them.

In the environment described above, this is of extreme importance. For medical schools, additional pressure was felt as a result of the Australian Medical Education Study, completed in 2008 that found some students graduate with “deficiencies in a number of clinical and procedural skills” as well as “inadequate knowledge of many of the basic medical science foundations” (DEEWR, 2008, p. 14). It is important to establish standards and practice at a national level so as to strengthen medical programs and medical graduates, maintain quality across all the country, and ensure that the unpalatable findings of the Australian Medical Education Study are rendered obsolete.

AMAC also has a strong emphasis on engaging institutions and helping to foster conversations about overall assessment quality and quality assurance of graduates. This has been demonstrated by AMAC through engagement forums, clinician workshops and piloting of assessments. Through the initial AMAC project (‘AMAC-1’), the topic of improving in-school assessments was raised constantly, therefore becoming part of what AMAC-2 has pursued. The aims for AMAC-2 were to foster the extensive expertise in the area of medical education and assessment in a larger collaboration in order to increase recognition of the importance of assessment quality and equip medical schools with processes to monitor the quality of their students’ learning outcomes.

AMAC also has an important international context. The project team recognise the important role that Australian medical schools play in our region and beyond. Australia is in close proximity to the massively growing economies of East Asia. These economies have expanding appetites for higher education and expansion in this area recently has been

significant, with no sign of waning. As such medical education in this region is developing rapidly. The important role for Australia in participating in this development should not be understated, but also should not be taken for granted. Within the AMAC team, a number of institutions already have a strong presence in the region. This offers potential strength for AMAC in terms of international relevance in these areas. Further strength in the project team in this regard is evidenced through the work of the Australian Council for Educational Research (ACER) in establishing a global footprint in this field through its design and coordination of the OECD's Assessment of Higher Education Learning Outcomes (AHELO) Feasibility Study.

In addition, the need to ensure that Australian education is highly regarded and internationally recognised is important so as not to lose relevance for students or employers. Through projects such as this, which emphasise strong collaboration based on improving education quality and learning outcomes, the strength of the Australian system will not only be able to survive in an increasingly competitive global environment, but it should also be able to stand tall as an exemplar of systemic quality.

Significant achievements of the initial AMAC project gave the team confidence and impetus to continue development and ensure future sustainability of the collaboration. Across the two OLT/ALTC grants provided to develop AMAC, the project has confirmed that there is general acceptance and recognition of need within the medical community for projects aimed at increasing assessment quality, providing comparisons of outcomes and facilitating collaborative approaches to fulfil these aims.

The establishment in 2014 of the Medical Deans of Australia and New Zealand (MDANZ) Benchmarking Project is clear evidence of this acceptance. The MDANZ project has essentially now encompassed AMAC as well as a number of complementary projects such as the Australian Medical Schools Assessment Collaboration (AMSAC), which involves a group of medical schools using shared assessment materials embedded in examinations at the mid-point of the medical degree; and the Australian Collaboration for Clinical Assessment in Medicine (ACCLAiM) project, which benchmarks clinical graduate outcomes across four medical courses. This recent development is discussed further below in relation to the outcomes and impact of AMAC.

## Intended outcomes

The aim of this project was to build on the achievements from the first AMAC project. This involved continuing the 'nuts and bolts' of the project – development of assessment items, conducting assessments and providing outcomes data to participants – while also developing some resources to detail the processes undertaken in developing AMAC with the intention to provide documents for guiding assessment collaborations in the future. These documents would be created with a wider audience than the medical education community in mind, and would offer insight, suggestions and an overview of the lessons learnt in the development of AMAC.

The resources to be produced through this project would cover the following important areas:

1. Quality issues in assessment development
2. Implementing and administering common assessments
3. Governance and dissemination in assessment collaborations

Alongside these specific resources, the AMAC-2 project intended to have a number of other outcomes, generally linked to spreading a wider understanding of the potential benefits of collaboration for assessment, benchmarking and development of capacity in these areas within universities. More specifically, the wider outcomes intended through this project were articulated early on as:

- the establishment of models for building assessment collaborations in higher education in Australia, transferable to other disciplines in higher education;
- the consolidation of AMAC as a body to facilitate the ongoing implementation of a national assessment of learning outcomes in the medical field;
- sector-wide involvement in an aspect of educational practice which is gaining serious momentum in the global landscape;
- recognition from stakeholders and government of the effectiveness of collaborative approaches to assessment in learning outcomes;
- workshop processes developed and tested;
- implementation of a pilot to test and evaluate processes developed;
- a national forum to disseminate outcomes and engage the sector in the values of AMAC; and
- papers in peer-reviewed academic journals detailing the processes and outcomes of the project.

# Project Approach

## Overview

### The project team

The collaboration between the 16 medical schools and ACER for this project is important. The members of the collaboration from medical schools represent the substantial diversity of medical education provision in Australia. The schools involved represent a variety in size, age, location and curricula, and the participating members of each school offer leadership, insight and innovation in all areas of medical education. ACER is a founding partner of AMAC and continues to play a significant role in the collaboration, offering expertise in assessment development and delivery and acting as an independent body for collating and disseminating data to schools.

The project was jointly led by Professor David Wilkinson (Deputy Vice Chancellor (Corporate Engagement and Advancement) Macquarie University), Professor Ben Canny (Monash University), Professor Lambert Schuwirth (Flinders University) and Associate Professor Hamish Coates (formerly, Director Higher Education Research, ACER, now at the University of Melbourne). Dr Daniel Edwards (ACER) managed and coordinated the project.

Formal project partners (i.e. those on the original OLT proposal) from participating universities were Professor Philip Jones (The University of New South Wales), Professor Ian Wilson (University of Wollongong), Associate Professor Ray Tedman (Griffith University), Professor Nicky Hudson (University of New England and The University of Newcastle Joint Medical Program), Dr Elina Tor (The University of Notre Dame, Fremantle), Associate Professor Michael Wan (The University of Notre Dame, Sydney) and Dr Janet McLeod (Deakin University). In addition, from ACER Jacob Pearce was a key member of the project team. Project partners not in the OLT grant submission include Associate Professor Paul Duggan (The University of Adelaide), Associate Professor Leo Davies (The University of Sydney), Dr David Kramer (The Australian National University), Professor Craig Zimitat (University of Tasmania), Associate Professor Charles Leduc (Bond University) and Ms Joy Rutland (University of Otago).

Project support was provided by test developers and psychometricians from ACER and administrative officers from all partners involved.

### Roles within the project

Oversight of the project rested with the leadership team and project manager. This group met numerous times throughout the project via teleconference and maintained regular email contact. A project reference group was convened for the project, meeting a number of times through its duration, providing feedback and advice on all aspects of the work (further detail on this group is included in later sections of this report).

In order to efficiently complete the work planned for this project, and to draw on the strengths within the project team, three core working groups were established. These

groups worked towards developing specific areas of the project. Each working group was responsible for development of one of the key resource documents that the project produced. The working groups and the production of these documents were coordinated by one of the project leaders as listed below:

1. Governance and Dissemination Working Group (coordinator, Prof Canny)
2. Quality Working Group (coordinator, Prof Schuwirth)
3. Implementation Working Group (coordinator, Dr Edwards)

## Engagement

There were a number of engagement strategies built into this project, designed to involve the medical education community in Australia as widely as possible. These have included:

- establishment of a Project Reference group, involving representatives of stakeholders from across the sector;
- engagement of university staff in identifying and contributing items for the development of the assessment;
- item review workshops, involving clinicians and medical educators (focussed development and review of new items and applying quality parameters being developed for the project);
- building of relationships with medical schools through pilot testing and consultation regarding implementation; and
- initiating dialogue with students through the development and dissemination of student reports based on the outcomes of AMAC assessment participation.

Overall, the fact that 16 of the 19 medical schools in Australia and New Zealand were in some capacity involved in the project is an indicator of engagement above and beyond the activities listed here.

## Item development

An AMAC Framework and item review process was developed and implemented through the AMAC-1 project and is detailed in that [project's OLT report](#) (Wilkinson, et al., 2012). In AMAC-2, the item review/workshop process was further refined and items specifications were improved based primarily on the work of the AMAC Quality Working Group. The ideas and specifications being developed in the Quality document – one of the resources developed in AMAC-2 –were tested through the item revision workshops held during 2013 as part of this project.

Item revision workshops were held at Flinders University, the University of Queensland and the University of Wollongong. Each workshop involved the participation of between eight and 12 clinicians from a range of specialities. The workshops were facilitated by the ACER members of the AMAC project team and organised by the host institution.

Each workshop involved an overview of AMAC followed by a discussion about 'what makes a good assessment item'. This general discussion included guiding participants through the ideas and quality specifications being explored through the Quality document being developed in AMAC-2. Participants were then involved in a discussion of basic psychometric

overview for analysis of item functioning. This discussion offered an introduction to, or revision of, the way in which analysis of assessments can be undertaken in order to generate a rich understanding of the way in which items function within assessments as a whole, and how each item individually can be examined in detail. Several items with robust item statistics piloted in AMAC-1 were presented and further revised based on information garnered from the psychometric analyses. These discussions helped to build a foundation for the main part of the workshops, which was to review the items submitted to AMAC. Item review resulted in one of three possibilities for each item – rejection, amendment for inclusion in AMAC, or inclusion without amendment.

In the three AMAC item review workshops held during the AMAC-2 project, 48 new items were developed based on the review of 96 items submitted (with 20 still to be workshopped). All three workshops were considered to be very successful by the AMAC facilitators, and feedback from participants was overwhelmingly positive. In total, through the AMAC projects, 168 items have been created through workshops, with 120 of these being used extensively within the AMAC assessment implementations.

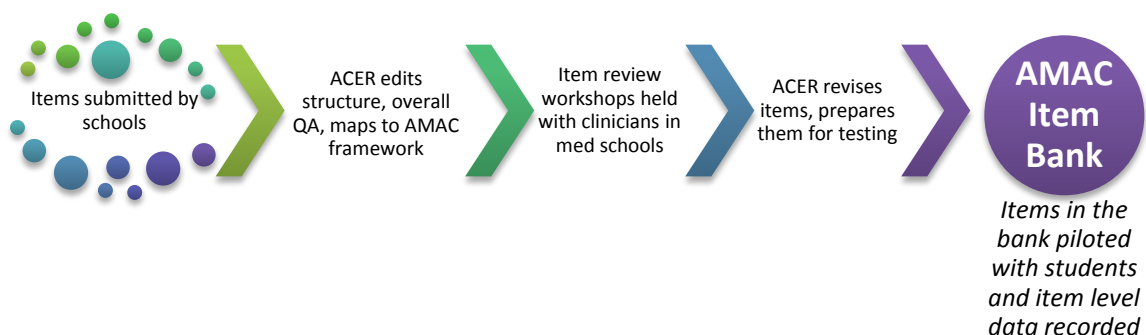
Another addition to this process in the AMAC-2 project was the development of a simple diagram outlining the overall process for item development. While there is nothing revolutionary about this particular diagram, it is displayed and mentioned here because it has become a useful tool for explaining one aspect of the AMAC project to a wide range of audiences.

Figure 1: AMAC item development process

Develop Assessment Framework – competencies, domains for *potential* assessment



Item specifications (on agreed sub-domains) sent to schools



## Implementation of AMAC items

AMAC items were used by medical schools in two ways during the period of the AMAC-2 project:

- online administration of a 'full' AMAC assessment; and
- embedding AMAC items within existing assessments.

The implementation of each of these models is outlined below. Further detail and discussion of the implementation aspect of AMAC is contained in one of the three major resource documents for this project: 'Implementing common assessment: lessons and models from AMAC'. Some of the text in the section below is taken from this document.

### Online implementation

The online administration of AMAC items involved participating students sitting a 100 item test. Six different online AMAC tests were developed that rotated through the 120 items developed in the first phase of the project. Four medical schools used the online implementation of AMAC in 2013.

An online testing platform – Online Assessment Reporting System (OARS) – developed and housed by ACER was used for the testing. This platform was accessed through a standard web browser via passwords (a unique password was provided to each participant). Students navigated their way through the test, answering multiple choice questions. Response data was collected by the ACER servers and stored securely.

Participating institutions were provided with a manual that detailed the specifications required and support was provided in ensuring computers were enabled for the testing. By using a platform that ran through any standard web browser, issues with installation of software and compatibility were avoided.

All institutions involved in the online implementation of AMAC undertook the test as a formative assessment. Sessions were invigilated and students were told that the test was to be completed under 'exam conditions' – i.e. individually – and without the use of supporting books/information. In most institutions, participation in the AMAC online assessment was voluntary, with students invited by their school to take part. In general the AMAC assessment was promoted as an opportunity to test oneself on a range of areas of medical education, in a low-stakes environment, and in many cases universities timed the testing to coincide with periods where study for summative exams was occurring.

Some universities held the AMAC assessment sessions in the faculty computer laboratories (often in multiple sessions due to the size of the labs). Other institutions undertook the testing in lecture rooms or exam halls and allowed students to use their own laptops to access and complete the test. Invigilators were present in the sittings of the test to ensure that the examination protocols were adhered to. Institutions reported back to AMAC project managers on the running of the sessions, completing a basic online form that described the implementation process and allowed for noting any adverse incidents.

## Embedded implementation

For AMAC in 2013, institutions were offered the possibility of utilising AMAC items in their existing examinations rather than running AMAC as a stand-alone online test. The reason for this development was that AMAC leaders believed that the assessment items should be able to be used flexibly and to the benefit of institutions in any way they deemed appropriate, and that some schools would prefer to utilise the items in existing exams rather than organise an additional test administration.

By 2013, the 120 originally developed AMAC items had robust psychometric data to validate them as a result of the online test administrations in 2011 and 2012. The individual items, the psychometric data and advice in interpreting this (along with further support when required) was provided to institutions interested in using AMAC items in their exams. Four medical schools took up the option of embedding items into exams in 2013. Three of these schools embedded items in the exams of two cohorts, meaning that in total, AMAC items were used in seven institutional-based assessments. Each institution reviewed the AMAC items and chose those which were appropriate to their needs. No specific requirements were given to schools in terms of the number of items or grouping of items that were chosen for embedding, ensuring complete flexibility for the schools involved.

Each of the medical schools chose a selection of AMAC items to embed. The number of items used ranged from 15 items in one institution to 46 in another. For further context, the AMAC items contributed to between 18 per cent and 33 per cent of all items used in the examinations in which they were embedded. All of the examinations in which AMAC items were embedded were summative assessments.

The institutions using the AMAC items implemented them in different ways. The most typical use was in a major exam during the last or second last year of the degree. Other uses included embedding items in smaller 'end of rotation' exams, completed after a particular clinical rotation and therefore focussed on a certain specialty. Data relating to student performance on AMAC items was sent back to the ACER project managers and used for developing reporting and to feed in to the psychometric analyses of the AMAC items.

## Reporting

The data collected through the AMAC assessments online and embedded were used to create student and institution-level reports for participants. The approach and details for this undertaking is described below. Again, some of this detail comes from the 'Implementing common assessment: lessons and models from AMAC' resource created during AMAC-2.

## Students

Providing student feedback was considered a vital element for AMAC. Students who participated in the formative online AMAC assessment were each provided with an individualised report detailing outcomes from the assessment in a range of areas and benchmarked to their fellow classmates as well as to other participants across medical schools in Australia and New Zealand. In 2013, participating students were generally sent



their individual report within two weeks of completing the assessment.

Given the number of items and the fact that each AMAC item was mapped to the framework by being ‘tagged’ in various ways (AMAC, 2012), there was good opportunity for reporting to students on a range of areas. An example of a table that summarised a student’s outcomes on the assessment is provided below (Table 1). As part of the report, information on interpreting the output is provided, as are caveats to this interpretation and a contact name and number for students to access should they have further queries. See the Appendix to this report for a sample AMAC Student Report.

It is not so much the detail in the numbers that is useful for the purposes here, more the overall indication on the type of output that was generated for individual students from the online implementation of AMAC.

Feedback from the students who participated and received a report was overwhelmingly positive. For some, the fact there was a report at all was a benefit. The importance of providing student feedback is critical. Lessons from other projects, such as the OECD’s AHELO Feasibility Study (Edwards, 2013) showed that motivating students for participating in a voluntary common assessment can be difficult.

**Table 1: Example output from AMAC Student Report based on online sitting, 2013**

Category	Sub-category	Your Score	Your % correct	Your school % correct	Full cohort* % correct [95% confidence]
<b>Medical Speciality</b>	Cardiology	5 of 7	71%	65%	63% [61,65]
	Clinical Pharmacology and Toxicology	8 of 12	67%	56%	57% [56,58]
	Endocrinology	8 of 9	89%	73%	72% [71,73]
	Gastroenterology and Hepatology	6 of 9	67%	42%	42% [41,43]
	Haematology and Oncology	9 of 11	82%	62%	59% [58,60]
	Immunology and Allergy	3 of 4	75%	68%	67% [65,69]
	Infectious Diseases	2 of 5	40%	54%	52% [50,54]
	Neurology	4 of 10	40%	53%	55% [54,56]
	Psychiatry and Mental Health	4 of 5	80%	77%	74% [72,76]
	Respiratory and Sleep Medicine	2 of 4	50%	63%	63% [61,65]
	Surgery	1 of 3	33%	61%	62% [60,64]
	Urology	4 of 4	100%	78%	77% [75,79]
	Women’s health (includes Obstetrics and Gynaecology)	6 of 10	60%	63%	62% [61,63]
	Other (incl. Dermatology, Emergency Medicine, Neonatal)	6 of 7	86%	55%	58% [56,60]
	<b>Total</b>	<b>68 of 100</b>	<b>68%</b>	<b>60%</b>	<b>60% [59,61]</b>
<b>Clinical Context</b>	Decision making	16 of 22	73%	62%	62% [61,63]
	Making a diagnosis	33 of 48	69%	62%	61% [60,62]
	Medical knowledge recall	6 of 10	60%	55%	55% [54,56]
	Medical testing	10 of 12	83%	64%	65% [64,66]
	Prescriptions	2 of 6	33%	46%	48% [46,50]
	Other (incl. Interpreting data, Patient assessment)	1 of 2	50%	43%	47% [44,50]
	<b>Total</b>	<b>68 of 100</b>	<b>68%</b>	<b>60%</b>	<b>60% [59,61]</b>
<b>Professional Practice</b>	Emergency management	12 of 14	86%	60%	59% [58,60]
	Patient assessment	36 of 56	64%	60%	59% [58,60]
	Patient management	13 of 20	65%	63%	64% [63,65]
	Other (incl. Patient interaction Not applicable)	7 of 10	70%	58%	57% [56,58]
	<b>Total</b>	<b>68 of 100</b>	<b>68%</b>	<b>60%</b>	<b>60% [59,61]</b>

\* Full cohort scores are based on all administered items for this student’s particular test rotation. Mean percentage correct are listed alongside 95% confidence intervals (displayed in square brackets).

## Institutions

For AMAC in 2013, two types of institution reports needed to be developed – one for those undertaking the online ‘full’ AMAC assessment, and one for those embedding the AMAC items in existing examinations. Institution reports were developed based on the data available for each school, with an emphasis on providing important benchmark information but with care to ensure: 1. de-identification of institutional outcomes; and 2. over-emphasis of statistically insignificant differences were avoided.

Care was taken to clearly re-state for institutions the cohort that they had involved in the testing and to provide various caveats around results, including differences in populations and timing of the implementation of assessments across participating institutions.

Some examples of the institutional report from 2013 output for online implementation are provided below. Figure 2 shows a boxed distribution chart highlighting the outcomes of an institution in comparison with other institutions involved in AMAC. This particular example shows the outcomes for students from this institution in 2013 and in 2012. The box-plot allows for the display of the distribution of student results rather than a sole focus on the mean outcomes for schools involved. This is intended to reduce the likelihood of simplistic conclusions being drawn about overall performance of a school and rather to promote a more considered appreciation of the span in student performance within and across participating schools.

As with the student reports for AMAC, consideration was given in the institution reports to providing some insight to schools about the relative outcomes of students across a range of disciplines and specialities. Figure 3 displays how this was done by medical speciality for participating schools in 2013. The figure here is used for illustrative purposes to highlight the potential of such reporting.

**Figure 2: Comparison of test score distributions between institutions 2011-2013 (n. 940 students, online formative implementation)**

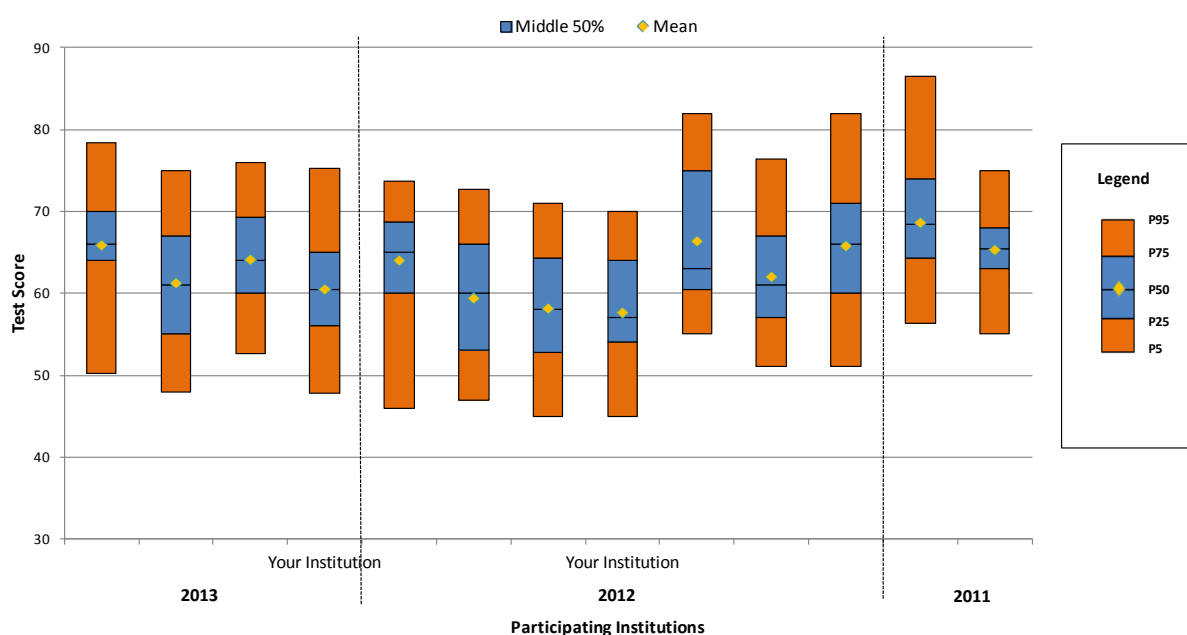
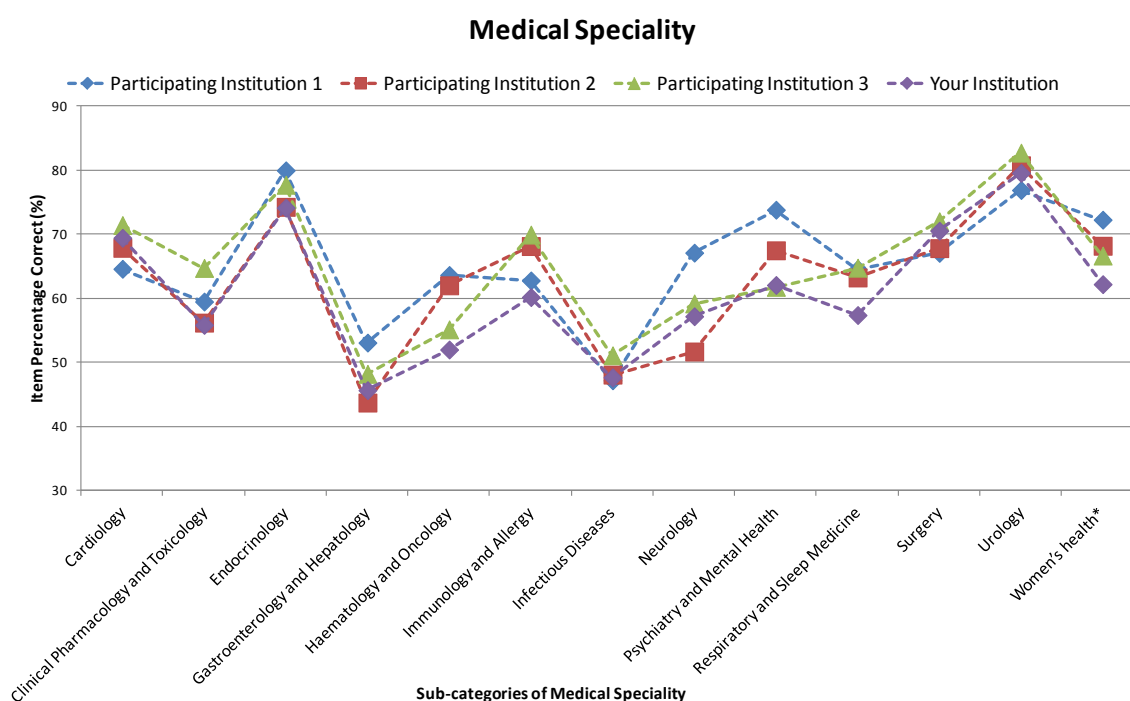


Figure 3: Comparison of item percentage correct between institutions, Medical Speciality sub-categories, AMAC 2013



\*Women's health includes Obstetrics and Gynaecology

## Development of resource documents

As noted earlier in this document, a core component of the AMAC-2 project was the development of documents to provide a resource for academics interested in developing assessment collaborations in the future. The three resource documents produced in this project are:

1. *Determining the quality of assessment items in collaborations; aspects to discuss to reach agreement*
2. *Implementing common assessment: lessons and models from AMAC*
3. *Governance Models for Collaborations involving Assessment*

Each of these documents will individually be available for download through the [AMAC website \(www.acer.edu.au/amac\)](http://www.acer.edu.au/amac) and at the OLT website, so the detailed findings are not discussed here. Rather, the overall process in their development is contained in this section.

## Issue identification and articulation

During the development of the proposal for the AMAC-2 project, the group identified that there were a number of important lessons learnt during the initial AMAC project which would be useful for articulating to others (both in medicine and elsewhere) as guidance in building collaborative assessment groups in the future. Initially four main areas were identified. As articulated in the original AMAC-2 proposal to the OLT, there were:

1. governance approaches;
2. development approaches;
3. implementation approaches; and

#### 4. quality comparison approaches.

In the early phase of the AMAC-2 project, a full team meeting was held in Sydney at UNSW in which sessions designed to discuss the issues relating to these four overall approaches were undertaken. Four sessions were run in parallel, whereby AMAC team members attended the session they felt they had the most to offer on. These sessions developed a range of ideas that were then discussed by the whole AMAC group in a subsequent session.

Following this workshopping of ideas, it was decided to synthesise the focus of the 'approaches' documents from four, to three main areas. This was mainly based on the commonality between 'development' and the three other areas being discussed – essentially discussion of development was required for each of these areas. In addition, there was a decision that some specific focus on dissemination was needed and that this would be best incorporated with discussion of governance. As such, following the team meeting the three documents listed at the start of this section would become key deliverables from the AMAC-2 project.

In order to consolidate the ideas developed and discussed in the full team meeting, a lead member from each area worked with the other members of the AMAC team to develop a 'one pager' describing the purpose, scope and potential outcomes of each of the documents. These three one pagers were distributed widely through the AMAC group, presented to the AMAC Reference Group and tabled at Reference Group meetings. They formed the basis for the development of the final resources produced for the AMAC-2 project.

#### Drafting and finalising

Drafting of the documents for AMAC-2 was coordinated and led by various members of the AMAC team. The Quality document was coordinated by Lambert Schuwirth and Jacob Pearce, the Implementation document by Daniel Edwards and the Governance and Dissemination document by Ben Canny and Hamish Coates.

A detailed draft was completed by each of the coordinators and distributed by email to the wider AMAC team for comment. Further contact was made with individuals within the team where clarification on issues suggested was needed. A final draft version was then produced and distributed for comment before the resource document was finalised for delivery.

The resource documents were delivered to the OLT alongside this Project Report. Before final public dissemination, they will be formatted by the ACER publishing team.

# Outcomes and achievements

This section provides a brief overview of the various outcomes and achievements identified by the AMAC team. This section aims to be succinct and therefore lists outcomes and achievements.

## Sector-wide involvement

A key indicator of success at establishing sector-wide involvement from key stakeholders is illustrated through the continual growth in the number of medical schools directly involved in the collaboration. By the beginning of 2013, the AMAC group comprised 16 medical schools and ACER. Each school has been involved in AMAC meetings, with most also contributing to item submission, item review workshops and implementation of the AMAC assessment items.

The medical schools actively involved in AMAC are listed below:

- The University of Queensland
- Monash University
- Flinders University
- The University of Notre Dame Australia (Sydney)
- The University of Notre Dame Australia (Fremantle)
- The University of Wollongong
- The University of New England/University of Newcastle (Joint Medical Program)
- The University of New South Wales
- Griffith University
- Deakin University
- Bond University
- The Australian National University
- University of Tasmania
- The University of Sydney
- Otago University (New Zealand)
- The University of Adelaide

The project held two face-to-face meetings, the first being held over two days in March 2013, hosted by UNSW, the second held in Melbourne in conjunction with the MDANZ National Assessment Forum in late June 2013. In addition, communication among the project team has been ongoing through email coordinated by the project manager at ACER.

AMAC-2 has also continued to attract the interest and attention of stakeholders. A number of important groups are represented in the AMAC Reference Group for the project, which has met once to date in the project. Membership of the Reference Group is detailed below:

- Australian Medical Students' Association (AMSA) – Steve Hurwitz
- Confederation of Postgraduate Medical Education Councils (CPMEC) – Terry Brown
- Medical Deans of Australia and New Zealand (MDANZ) – Richard Hays

- Health Workforce Australia (HWA) – Ben Wallace
- Office for Learning and Teaching (OLT) – Siobhan Lenihan and Ellen Poels

## AMAC item bank

Development of the AMAC item bank has involved item submissions, item review workshops and finalisation of items. The involvement of institutions, clinicians and academics in these processes for AMAC-2 is documented here, followed by an overview of the AMAC items developed through both the AMAC-1 and AMAC-2 projects.

Items for the AMAC-2 project were submitted by the following medical schools:

- The University of Adelaide
- The University of Notre Dame, Sydney
- University of Otago
- Deakin University
- The University of Queensland
- University of Wollongong
- Bond University (through the [IDEAL Consortium](#)'s shared database)

Item review workshops were held at three medical schools, with details below:

- Flinders University (July 25, 2013), with 8 clinicians affiliated with Flinders and University of Adelaide.
- The University of Queensland (August 2, 2013), with 8 clinicians.
- University of Wollongong (August 13, 2013), with 8 clinicians.

In addition, a workshop at the University of Notre Dame, Fremantle was organised but had to be cancelled at the last minute due to a serious illness to a key project member.

In total, the AMAC-2 project collected 96 items from universities (excluding the IDEAL items). These items were revised in detail during workshops and a total of 48 were polished and prepared for testing. In addition, 20 items are still ready to be revised from the 96 submitted, and a further 600 items from the IDEAL database were extracted for AMAC based on detailed specifications and liaison with medical educators at Bond University. These particular items have yet to be put through workshops.

In total, across AMAC-1 and AMAC-2, 168 items have been developed that fit within the quality specifications developed by the collaboration. 120 of these have been comprehensively trialled, while the remaining items are yet to be used. All items are mapped to the AMAC Framework and 'tagged' to provide detail based on seven different item categorisations.

## AMAC assessment implementations

In 2013, for AMAC-2, eight medical schools conducted assessments which involved the inclusion of AMAC items. Some of the schools involved in the embedded approach ran the AMAC items with more than one cohort of students, so in total AMAC items were embedded in seven different summative assessments in Australian medical schools in 2013.

#### AMAC 2013 – Online implementation (formative assessment)

- The University of New South Wales
- The University of Notre Dame , Sydney
- The Australian National University
- The University of Notre Dame , Fremantle

#### AMAC 2013 – Embedded items (summative assessment)

- The University of Otago
- The University of Queensland (two cohorts)
- Griffith University (two cohorts)
- The University of Adelaide (two cohorts)

In 2013, a total of 1,521 medical students in their clinical years undertook an examination with AMAC items in 2013 – 1,084 of these in a summative exam and 437 in an online formative exam.

### AMAC Resource Documents

As detailed above, three documents have been produced in this project, designed as resources for guiding future assessment collaborations. The documents are publicly available and are listed again here:

1. *Determining the quality of assessment items in collaborations; aspects to discuss to reach agreement*
2. *Implementing common assessment: lessons and models from AMAC*
3. *Governance Models for Collaborations involving Assessment*

### Influencing assessment approaches

Through the momentum generated by AMAC and AMAC-2 in influencing assessment approaches in medical education, an ongoing benchmarking project has been initiated by the Medical Deans Australia and New Zealand (MDANZ). The influence of AMAC, alongside some other medical assessment collaborations, has led to a new coordinated approach by the Deans' group. In 2014, MDANZ have been conducting a sector-wide benchmarking project, funded by Health Workforce Australia.

The AMAC resources produced in this project are aimed at helping to provide information to MDANZ for building a sustainable common assessment program. In addition, the AMAC team have involved members of the MDANZ Benchmarking project in Reference Group meetings, and ACER team members have hosted the MDANZ project manager early in 2014 to provide insights from the AMAC project.

Detail on the MDANZ Benchmarking work is available at their website here:

<http://www.medicaldeans.org.au/projects-activities/assessment-benchmarking>

There are additional possibilities for sharing the outcomes of AMAC with other assessment

collaborations outside Australia and New Zealand. The UK's Medical School Council Assessment Alliance in particular has a similar project running and potential future joint ventures between Australian and UK medical schools on common assessment projects are now a likely reality as a result of the experience gained through AMAC.

## Journal articles

To date, the AMAC project has had two articles published in high quality academic journals. A third article is drafted and ready for submission and it is anticipated that the three resource documents developed for this project will also be reconfigured as scholarly articles in the future.

The articles published to date are:

Edwards, D., Wilkinson, D., Canny, B., Pearce, J., & Coates, H. (2014). Developing outcomes assessments for collaborative, cross-institutional benchmarking : progress of the Australian Medical Assessment Collaboration. *Medical Teacher*, 36(2), 139-147 (<http://informahealthcare.com/doi/abs/10.3109/0142159X.2013.849798>).

Wilkinson, D., Canny, B., Pearce, J., Coates, H., & Edwards, D. (2013). Assessment of medical students' learning outcomes in Australia : current practice, future possibilities. *Medical Journal of Australia*, 199(9), 578-580 (<https://www.mja.com.au/journal/2013/199/9/assessment-medical-students-learning-outcomes-australia-current-practice-future>).

## International Conferences

Pearce, J. & Edwards, D. (2014) 'Collaborative Assessments of Learning Outcomes: Generating Positive Institutional Change' presented at ICED 2014 Conference, Stockholm, Sweden, July. ([http://www.iced2014.se/proceedings/1635\\_Pearce\\_Edwards.pdf](http://www.iced2014.se/proceedings/1635_Pearce_Edwards.pdf))



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- Edwards, D. (2013, December 2013). *The AHELO experience - implementation, outcomes and learning from an Australian perspective*. Paper presented at the NIER Tuning-AHELO Symposium, Tokyo.
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# Appendix A: Example AMAC Student Report, 2013

## Australian Medical Assessment Collaboration (AMAC)

4<sup>th</sup> of July, 2013

Example Student, example.student@email.com

Thank you for participating in the 2013 online assessment developed by the Australian Medical Assessment Collaboration (AMAC). Your involvement is valued and will contribute substantially to the ongoing development of AMAC.

AMAC is a project currently funded by the Office for Learning and Teaching, conducted by a collaboration of 16 medical schools in Australia and New Zealand, along with the Australian Council for Educational Research. For further information about AMAC, please visit [www.acer.edu.au/amac](http://www.acer.edu.au/amac).

Your results in the assessment are provided below. They offer an overview of your outcomes by three broad categories, disaggregated to a number of sub-categories. The broad categories reported here are Medical Speciality, Clinical Context and Professional Practice. Each of the 100 AMAC items you took in the test is mapped to a sub-category in all of the three broad categories. The report offers two comparison scores: 'Your classmates' is a comparison with others from your school who took part in the test in 2013; 'Full cohort' offers an average across all students who have participated in AMAC over the past 18 months. In total, 687 later year MBBS students from 7 institutions in Australia and New Zealand form the 'Full cohort'.

Category	Sub-category	Your Score	Your % correct	Your school % correct	Full cohort* % correct [95% confidence]
Medical Speciality	Cardiology	5 of 7	71%	65%	63% [61,65]
	Clinical Pharmacology and Toxicology	8 of 12	67%	56%	57% [56,58]
	Endocrinology	8 of 9	89%	73%	72% [71,73]
	Gastroenterology and Hepatology	6 of 9	67%	42%	42% [41,43]
	Haematology and Oncology	9 of 11	82%	62%	59% [58,60]
	Immunology and Allergy	3 of 4	75%	68%	67% [65,69]
	Infectious Diseases	2 of 5	40%	54%	52% [50,54]
	Neurology	4 of 10	40%	53%	55% [54,56]
	Psychiatry and Mental Health	4 of 5	80%	77%	74% [72,76]
	Respiratory and Sleep Medicine	2 of 4	50%	63%	63% [61,65]
	Surgery	1 of 3	33%	61%	62% [60,64]
	Urology	4 of 4	100%	78%	77% [75,79]
	Women's health (includes Obstetrics and Gynaecology)	6 of 10	60%	63%	62% [61,63]
	Other (incl. Dermatology, Emergency Medicine, Neonatal)	6 of 7	86%	55%	58% [56,60]
	<b>Total</b>	<b>68 of 100</b>	<b>68%</b>	<b>60%</b>	<b>60% [59,61]</b>
Clinical Context	Decision making	16 of 22	73%	62%	62% [61,63]
	Making a diagnosis	33 of 48	69%	62%	61% [60,62]
	Medical knowledge recall	6 of 10	60%	55%	55% [54,56]
	Medical testing	10 of 12	83%	64%	65% [64,66]
	Prescriptions	2 of 6	33%	46%	48% [46,50]
	Other (incl. Interpreting data, Patient assessment)	1 of 2	50%	43%	47% [44,50]
	<b>Total</b>	<b>68 of 100</b>	<b>68%</b>	<b>60%</b>	<b>60% [59,61]</b>
Professional Practice	Emergency management	12 of 14	86%	60%	59% [58,60]
	Patient assessment	36 of 56	64%	60%	59% [58,60]
	Patient management	13 of 20	65%	63%	64% [63,65]
	Other (incl. Patient interaction Not applicable)	7 of 10	70%	58%	57% [56,58]
	<b>Total</b>	<b>68 of 100</b>	<b>68%</b>	<b>60%</b>	<b>60% [59,61]</b>

\* Full cohort scores are based on all administered items for this student's particular test rotation. Mean percentage correct are listed alongside 95% confidence intervals (displayed in square brackets).

It is important to note that your outcomes on this test have no impact on your university results. The full cohort of students for comparison purposes is not a representative sample of all medical students in Australia and New Zealand. In addition, the questions in each sub-category are not designed to be representative of the entire sub-category. As such interpretation of outcomes here should be undertaken with caution. The full cohort scores in the table offer the mean percentage correct outcome for all students who participated, as well as the 95 per cent confidence intervals for each category (in square brackets).

If you have further questions or feedback about the project, please contact:

[Contact details of university staff member included here]

***Additional information:***

Each item in AMAC is mapped to a number of categories. Three of the categories (and their sub-categories) are used in this report. The broad categories are:

- **Medical Speciality**, with sub-categories based on recognised Australasian medical disciplines;
- **Clinical Context**, with sub-categories to describe the type of action required in the item; and
- **Professional Practice**, with sub-categories relating to the clinical management context in the item.

The multidimensional categorisation of items in AMAC allows for reporting of items in more than one way. For example, consider an item which asks a student to identify the most appropriate first management step when an elderly man presents with symptoms of a stroke in the emergency department. This item could be categorised as 'Neurology' in Medical Speciality, 'Decision Making' in Clinical Context and 'Emergency management' in Professional Practice.

The AMAC Framework document offers further details relating to the structure and tagging of AMAC items, categories and sub-categories. This document can be downloaded from [www.acer.edu.au/amac/framework](http://www.acer.edu.au/amac/framework).